

ings were issued. Light frost occurred in eastern Oregon and in southwestern Idaho on the morning of the 29th. Warnings of this frost were issued on the morning of the 28th.—*E. A. Beals, Forecast Official.*

### RIVERS AND FLOODS.

The rivers fell generally during August, the lowest stages for the month occurring almost uniformly during the last two or three days. There was, however, ample water for navigation except above Cincinnati, Ohio, where low stages caused a suspension after the 22d.

The crest of the Brazos River flood passed Booth, Tex., on the 8th, with a maximum stage of 38 feet, one foot below the danger line. This flood was described in the WEATHER REVIEW for July, 1902. There was no other high water except locally in the Wateree River in South Carolina on the 15th and 16th, where heavy showers caused a 20-foot rise that disappeared as rapidly as it came.

The highest and lowest water, mean stage, and monthly range at 142 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfeld, Forecast Official.*

### CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions during August are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau:

**Alabama.**—The month, as a whole, was hot, dry, and generally unfavorable for all growing crops, though fairly good and beneficial rains fell during the first few days, and very general rains during the last few days relieved the long-protracted drought, the rainfall being excessive in a few places. Cotton deteriorated steadily and promises the poorest yield in years; corn promises a poor yield and minor crops poor to fair only.—*F. P. Chaffee.*

**Arizona.**—General rains occurred in the early part of the month and languishing vegetation was revived. The rains continued intermittently throughout the month, and the soil was well soaked in many localities. In sections where a total crop failure was apprehended a harvest will be made.—*William G. Burns.*

**Arkansas.**—At the close of the month cotton had deteriorated to such an extent that many correspondents estimated the yield at from half to two-thirds of a crop. Early corn made a good crop in central and southern portions of the State, but late corn was greatly injured by drought in the northern counties. There were many complaints of its drying up, and much of it was cut to save the fodder.—*E. B. Richards.*

**California.**—Temperature slightly below normal during the month retarded the ripening of grapes and late deciduous fruits to some extent. Field and forest fires caused considerable damage in the northern section. Grain harvest and haying were nearly completed at close of the month. Wheat, oats, barley, and hay yielded large crops. Deciduous fruits were above the average yield and a heavy crop of grapes was expected.—*Alexander G. McAfee.*

**Colorado.**—The rainfall was not only unevenly distributed, but it also came too late to effect a material improvement in the condition of those crops which were suffering from the protracted drought and scarcity of water. The ranges in the south-central sections, however, were revived by the copious precipitation of the last decade and gave promise of good fall pasturage at least. The conditions as regards moisture were less favorable in the northern counties, and as only a few of the very old ditches in the north-central section were supplied with water for irrigation, corn, potatoes, and other late crops continued to deteriorate. Harvesting and thrashing of grain crops were prosecuted under favorable conditions. In a few localities only was a third crop of alfalfa obtained. Fruit made normal advancement, and a large crop of good quality was marketed.—*F. H. Brandenburg.*

### AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.*	Lat. N.	Long. W.	Date.*	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
<b>High areas.</b>										
I.....	1, p. m.	50	120	3, p. m.	47	87	1,600	2.0	800	38.3
II.....	4, a. m.	53	122	7, a. m.	37	98	2,050	3.0	683	28.4
III.....	9, a. m.	53	122	13, p. m.	39	75	2,900	4.5	644	26.8
IV.....	13, a. m.	50	100	17, a. m.	39	82	1,450	4.0	362	15.0
V.....	18, p. m.	48	125	25, a. m.	38	80	2,950	6.5	454	19.0
VI.....	25, a. m.	50	108	30, p. m.	37	75	2,700	5.5	491	20.4
Sums.....							13,650	25.5	3,434	142.9
Mean of 6 paths.....							2,275		572	23.8
Mean of 25.5 days.....									535	22.3
<b>Low areas.</b>										
I.....	1, a. m.	51	114	4, a. m.	43	71	2,400	3.0	800	33.3
II.....	2, p. m.	34	113	7, a. m.	48	68	3,050	4.5	678	28.2
III.....	6, a. m.	53	105	7, p. m.	49	86	1,000	1.5	667	27.8
IV.....	7, p. m.	54	114	12, p. m.	46	60	2,600	5.0	520	21.7
V.....	8, p. m.	44	103	10, a. m.	35	97	825	1.5	550	22.9
VI.....	10, p. m.	50	120	13, p. m.	38	105	2,250	3.0	750	31.3
VII.....	16, a. m.	41	112	18, a. m.	37	100	1,400	2.0	700	29.2
VIII.....	23, p. m.	51	114	25, p. m.	37	100	1,600	2.0	800	33.3
Sums.....							15,125	22.5	5,465	227.7
Mean of 8 paths.....							1,891		683	28.5
Mean of 22.5 days.....									672	28.0

\*The "a. m." and "p. m." refer to the regular 8 a. m. and 8 p. m. weather maps.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

**Florida.**—High midday temperatures and ample sunshine stimulated the opening of cotton, which at the close of the month was from half to two-thirds open, and the crop was about half picked. The warm, frequent showers benefited cane and late cotton. The citrus fruit crop will be much reduced. The prospect for sweet potatoes is poor, dry weather causing a reduced acreage. Seeding for fall and winter gardens is backward.—*A. J. Mitchell.*

**Georgia.**—Drought conditions which prevailed at the close of July were intensified, and continued until about the close of the month, when general rains fell. Cotton suffered from rust and premature opening, and steadily deteriorated during the latter half of the month. The rains at the close of the month were too late to be of much benefit and badly discolored the staple. A short yield was in prospect, with little or no second growth visible.—*J. B. Marbury.*

**Idaho.**—While there were no storms of great severity during the month, the weather was showery in the northern counties from the 15th to 18th and in the southern sections from the 12th to 16th. The showers were followed by quite general frosts on the 18th and 19th, causing slight injury to tender vegetation. Light frosts occurred nightly in elevated sections from the 26th to the close of the month.—*S. M. Blandford.*

**Illinois.**—Rainy weather prevailed over most of the State during a large part of the month. In the middle and northern portions the rains caused considerable damage to grain in shock, but in the southern portion, where the weather had previously been rather dry and where thrashing was nearly completed, the rains were beneficial. The cool and wet weather of the month caused corn to mature very slowly, though a large crop of it was being made. In the southern district there was a decided improvement in the crop. During the latter part of the month corn matured more rapidly. Grasses, gardens, and potatoes did well during the month and at the end of the month pastures were in good condition. The apple prospects improved during August. The fruit dropped less than previously and there was considerable improvement in its quality.—*M. E. Blystone.*

**Indiana.**—With the exception of that in the north section and very late plantings in other places, the corn crop was unusually promising and much of it was cut and shocked. During the last half of August cutting corn, digging potatoes, cutting and thrashing clover, canning tomatoes, gathering pears, cutting tobacco, and plowing for fall seeding was in progress; potatoes were yielding an exceptionally heavy crop; fruit was of good quality, but ripened slowly; pears and grapes were good to fair; apple trees, with the exception of a comparatively few orchards, were bearing a very light crop of fruit; pastures were generally good.—*W. T. Blythe.*

**Iowa.**—August was excessively wet, cool, and cloudy, the average rainfall being more than double the normal amount. The conditions were unfavorable for harvesting and thrashing, and the damage to oats, wheat, rye, and barley, exposed to the weather in shocks, was very heavy. A large percentage of oats were entirely ruined and all grain crops suffered heavily. Corn became very rank and was heavily eared, but at the close of the month was ten to fifteen days later than usual. The minor crops and vegetables made heavy growth.—*John R. Sage.*

**Kansas.**—Warm, wet month, improving late corn, apples, forage crops, and pastures. Wet weather stopped haying, plowing, alfalfa cutting and thrashing, injured potatoes in ground, and caused wheat, oats, and flax to sprout in stacks. Much early corn cut, some marketed and some being fed. Prairie haying progressed where possible and a fine crop of fine hay was put up.—*T. B. Jennings.*

**Kentucky.**—The rainfall was very unevenly distributed and was deficient in most sections, consequently vegetation suffered in many localities. The condition of the corn crop at the close of August was not quite as good as it was at the close of July. It improved in some localities in the southern and extreme western counties, but deteriorated in many of the northern and eastern counties. Very nearly an average yield was promised, however. Much of the early crop was cut. Tobacco improved slightly in some of the western counties and about held its own in the Burley district. It will not be a full crop. Cutting and housing was progressing under favorable conditions. A good crop of hemp was cut. Pastures suffered for rain. Second crops of hay were light. Minor crops, gardens, and trucks were fairly good in some sections; very poor in others. Plowing for winter grains progressed where condition of soil permitted, and some oats were sown.—*H. B. Hersey.*

**Louisiana.**—The cotton crop was not doing well at the opening of the month and excepting some beneficial weather during the first and second decades, no material improvement resulted during August; rust damaged the crop in many parts of the State; many complaints of shedding were received; the bulk of early cotton was open by the close of the month, but the unusually hot weather interfered with outdoor work and picking progressed slowly; the crop was generally below an average and in some places was very poor. The weather of the month was generally favorable for sugar cane and a rapid and healthy growth resulted. Late rice showed much improvement; the bulk of early rice was housed in good condition. The best yield of rice was in the parishes bordering on the river.—*I. M. Cline.*

**Maryland and Delaware.**—August temperatures were moderate and pleasant. There were no hot waves. The rainfall was but little more than half the normal amount. The moisture was sufficient in limited districts, but for the section at large conditions of semidrought prevailed, with untoward effects on all crops. Early corn withstood the dry weather well, but the late corn was hurt; fodder saving made good progress, and some corn was cut toward the end of the month. Wheat thrashing continued. Oats were harvested in the west, with fine yields. Buckwheat fared well. Pastures were generally poor. Early tobacco was largely saved in good condition, but the yields were light; late tobacco suffered for rain. Peaches and pears were fair to good in places, poor in others, while apples were generally scarce. Tomatoes were of good quality, but the output was lighter than expected. Potatoes varied from poor to very good, but in general were above average. Fall plowing was delayed by the hard soil. Gardens suffered somewhat, and fall patches of turnips and late cabbages were hurt by the dry weather.—*E. C. Easton.*

**Michigan.**—The generally dry, cool weather which prevailed during most of August was favorable for the completion of wheat and rye harvests and haying, which had been greatly delayed by the excessive rainfall of July. Wheat, rye, barley, and hay were quite generally secured by the 10th, and oat harvest had begun in most counties of the lower peninsula. Oats, although considerably lodged, matured finely and were well secured by the 20th; the crop was a good one. The cool, dry weather was not favorable to the growth of corn, which continued backward during the entire month. Potatoes and beans improved somewhat until about the 15th, after which they made little progress, especially potatoes, which at the close of August showed considerable blight and were much in need of rain. Sugar beets made good progress throughout the month and at its close were in a promising condition; buckwheat filled nicely and was nearly ripe. The dry condition of the soil made fall plowing slow and the lack of rainfall considerably retarded that work; at the close of the month the soil was quite dry and hard and when plowed turned up very lumpy. Several light frosts occurred during the month, but the damage resulting was generally quite light. Fruit continued to do well and the yields of early peaches and apples were fairly good, while the prospects for pears, late peaches, and winter apples were good.—*C. F. Schneider.*

**Minnesota.**—Local storms with their attendant heavy rains and high winds lodged large areas of grain, which made harvest difficult and slow. The harvest of early barley and oats had reached the northern boundary by the first of the month, and spring wheat cutting had extended to the central portions of the State, while in southern portions all the barley was cut, and oat and spring wheat harvest was well advanced. The harvesting of all these crops advanced northward during the month, so that by the end of the month half to two-thirds of the spring wheat was cut

in the extreme north, and all the barley and oats, except the latest, and flax cutting was generally well advanced in all sections. Stacking and thrashing from the shock followed harvest as rapidly as possible. Corn grew well in the early part of the month, but the weather in the latter part was too cool and damp for the most favorable ripening conditions.—*T. S. Outram.*

**Mississippi.**—The hot, dry weather during the middle of the month damaged cotton and early corn in the middle and southern counties very seriously. Late crops were revived by general rains on the 28th and 29th. Cotton opened very rapidly, much of it prematurely, and by the end of the month picking was well advanced. The general outlook for cotton was for less than an average yield.—*J. M. Kirk.*

**Missouri.**—Over the greater portion of the State the month was cool and showery, and in many of the northern and western counties there was much more rainfall than was needed. Drought continued in the southeastern counties until the 26th, when heavy showers were general over that section. The ripening of early corn was somewhat retarded by the cool, showery weather, but otherwise the crop continued in excellent condition, except in a few southeastern counties, where late corn was considerably injured by drought. Pastures were excellent, as a rule, and all late forage crops made a heavy growth. Thrashing was considerably retarded by rains during the latter half of the month and much further damage was done to grain in stack. Plowing for fall seeding was considerably delayed in the southern sections during the fore part of the month by the dryness of the ground, while during the latter part the soil in some of the northern and western counties was too wet.—*A. E. Hackett.*

**Montana.**—Haying was carried to completion and a heavy crop obtained. Grain began to ripen during the early days of the month; at the close of the month harvesting was practically completed and thrashing was progressing generally; the grain yield was proving fair to good, and in some localities excellent. The early potato crop is good, but the late is not promising. The Flathead County apple crop promises an unusually large yield. Cutting of second crop of alfalfa began latter part of month, with encouraging prospects.—*Montrose W. Hayes.*

**Nebraska.**—The rainfall was deficient in the southern part of the State during the first half of the month and in a few southwestern counties corn was damaged by lack of moisture. The area affected, however, was small. With this exception the rainfall exceeded the normal, and corn made a vigorous growth, but did not ripen as fast as usual. The stalks are large, with an unusually large number of well-filled ears. Haying and thrashing were retarded by moisture most of the month and some damage resulted to both hay and grain. Pastures were exceptionally fine.—*G. A. Loveland.*

**Nevada.**—The weather of the month was slightly cooler and drier than usual. Conditions were very favorable for harvesting operations and the maturing of large crops. Pasturage was fairly good in most sections and live stock continued in excellent condition. Crops under proper irrigation made satisfactory growth and at the close of the month looked promising. Haying was practically finished at the end of the month and a good crop was cut and saved without damage. The harvesting of grain was in active progress throughout the month; considerable thrashing had been done when the month closed, the yield being about average.—*J. H. Smith.*

**New England.**—The weather of the month has been generally favorable for the growth and harvesting of crops and for farm work. The low temperature has been unfavorable for corn, which is practically a failure. The second crop of grass is heavy and has been secured in good condition. Apples and peaches are a good crop, except winter varieties of apples, which are a failure. A large crop of tobacco of excellent quality has been secured.—*T. L. Bridges.*

**New Jersey.**—The prevailing weather conditions were generally unfavorable; cool nights retarded the maturing of corn and tender vegetation. Thunderstorms were quite frequent during the month and very destructive on the 10th and 21st. On these dates damage to the amount of \$150,000 was done to buildings and crops in the vicinity of Trenton, Mercer County.—*Edward W. McGinn.*

**New Mexico.**—The drought existing in a more or less degree during the entire growing season over all sections, excepting the extreme southeast, was broken early in August by good, general showers. Range grass started rapidly, and by the close of the month good fall and winter feed for stock was generally assured, excepting on some northern and north-eastern ranges. Corn and the later growths of alfalfa, melons, and late fruits were greatly benefited. Late peaches, apples, pears, and plums ripening in particular excellence.—*R. M. Hardinge.*

**New York.**—Heavy rains with gales and destructive hail occurred in places on the 3d, and showers were frequent until the 11th, after which it was generally dry. Rains damaged wheat, rye, oats, hay, potatoes, corn, and beans. The weather after the 11th was generally favorable for farm operations excepting fall plowing, which was delayed by the dry condition of soil. Potatoes suffered a marked decline, and corn and beans were very poor, while the condition of buckwheat was improved. The yield of wheat, rye, barley, and hay was good, while the crop of oats was very fine. Pears, peaches, and grapes promised to be light, and grape rot was reported. Apples were decidedly variable, the outlook generally pointing to a supply smaller than the average. Hops appeared

to be light and inferior, and tobacco less than the average crop. Pastures continued in good condition.—*R. G. Allen.*

**North Carolina.**—During the greater part of August weather conditions were generally favorable for the growth of crops, except that there were more local storms with damage by wind and hail over limited areas than at any previous time during the season. While showers were frequent there were many counties in which drought prevailed, and in consequence there was a slight deterioration in many crops. The rainfall was deficient and very irregularly distributed, and during the last decade drought prevailed everywhere. Old corn suffered much from the drought, but late planted remained very promising. Curing tobacco progressed very rapidly with excellent results. Early upland cotton began to open during the first decade, and soon the crop was opening generally, with picking underway. Minor crops did fairly well.—*C. F. von Herrmann.*

**North Dakota.**—The month was, as a rule, unfavorable for harvesting, frequent rains retarding work and also causing some early cut grain to sprout in the shock, while high winds were detrimental to stacking and haying. Cool, damp weather also kept grain from maturing, and at the close of the month most of the late sown grain and all corn was still green. Light frost on the 11th did some damage to crops.—*B. H. Bronson.*

**Ohio.**—First half of the month was showery and the last half cool, with but little rain. Corn is generally promising, except in extreme northeast; in the southwest late corn is injured some by drought; early corn is ripening and cutting has commenced. Tobacco good and being secured in good condition. Clover seed and grapes fair. Apples are a little more promising at close of month. Plowing progressing.—*B. L. Waldron.*

**Oklahoma and Indian Territories.**—The month was generally hot and dry with occasional hot winds which were damaging to fall crops; cotton boiled and fruited well, but soon deteriorated under the combined influence of hot winds and boll worms, giving prospects for not more than half crop; the middle and top crops were most affected, the bolls opened prematurely or dropped off; picking was in progress by the 11th. Corn was cut with fair to good yields, while late corn was much affected by the hot winds; broom and kafir corn, cane, castor beans, millet, and alfalfa were secured with fair to good yields. Plowing for fall wheat progressed slowly, but the ground was ready to seed by the close of the month. Grass continued in good condition, water was plentiful, and stock was generally in good condition; haying progressed during the month. Late potatoes and turnips were sown. Late fruit, especially the peach crop, was seriously injured by the hot winds and dried or withered on the trees.—*C. M. Strong.*

**Oregon.**—The weather during the month was very favorable for harvesting the grain crop, which was secured in excellent condition. The crop was probably an average one, notwithstanding that in many sections the yields were less than expected. Hops and corn made excellent advancement. Potatoes did fairly well, but they would have been more thrifty and promising if the weather had not been so dry. Potato blight affected the crop to a considerable extent in the coast counties. Sugar beets and field onions did well. Early apples and peaches were plentiful in the markets by the end of the month.—*Edward A. Beals.*

**Pennsylvania.**—Showers were general in nearly all districts during the first decade, but after the 11th the rainfall was light and scattered and drought conditions prevailed in many localities. Light frost was recorded in the more elevated districts during the last decade. Oats and clover made good progress and the yield was generally satisfactory. Pastures furnished ample feed, but were in need of moisture at the close of the month. Garden truck was plentiful. Buckwheat developed nicely and a good crop seems assured. A large acreage of corn is backward and some fields will be cut for fodder and others are in danger of damage by early frost. Tobacco plants are late but generally thrifty. Potatoes are good size but small crop, and complaints of injury by rot and blight are numerous. Fruit ranges from good in some sections to a failure in others, and as a whole the crop will probably be below normal.—*T. F. Townsend.*

**Porto Rico.**—Farming operations delayed and plant growth and development checked by serious drought. Sugar making discontinued, owing to the lateness of the season. Young canes did well until toward the end of the month, when they, too, began to show signs of suffering. Planting for gran cultura commenced. A promising coffee crop is now about ready for the picker. The picking has commenced in the southern part of the coffee district. Some seeds have been sown and other preparatory work done for a new tobacco crop. Some corn gathered during the month; late corn injured by the drought. Rice crop seriously damaged; in some places it is a total loss. The usual preparations for minor crops have been made as far as practicable. Pineapples, alligator pears, mangoes, bananas, and other fruits plentiful. Pasturage becoming short.—*E. C. Thompson.*

**South Carolina.**—Neither the deficiency in temperature nor in precipitation affected the favorable progress and development of most of the growing crops, although cotton deteriorated steadily, due to rust that caused the plants to shed their leaves, squares, and young bolls. Cotton opened early and rapidly, and picking was well under way by the close of the month. Corn became very promising, and all other crops made satisfactory progress.—*J. W. Bauer.*

**South Dakota.**—Generally favorable weather attended the harvesting

of spring wheat, oats, barley, and speltz, which work was completed by the 25th, with promising outlook for very good yields and quality of grain, but frequent rains in the third decade retarded stacking and thrashing from shock, and in the middle-eastern and southeastern counties damaged some grain in shock. Corn continued backward throughout the month. Frost on the 11th injured considerable corn, principally the late planted, in parts of a number of middle-eastern and northeastern counties, some fields irreparably, and also some millet, flax, and late potatoes. At the close of the month the corn outlook was poor to fair in the localities where affected by the frost, and elsewhere generally fair to very good, but the crop was greatly in need of warm, dry weather; early flax was good and mostly cut, late flax poor and some yet green; early potatoes were matured, a good crop; late potatoes only fair; the bulk of a large hay crop was secured; pastures were good and live stock in fine condition; hail did some damage locally to corn, flax, millet, and gardens.—*S. W. Glenn.*

**Tennessee.**—The rainfall was generally insufficient for the needs of growing and maturing crops, and early corn was generally much reduced in prospective yield. Late corn held up well and promised fair to good yields. The outlook for cotton had been very encouraging and was still fairly good at the end of the month, though rust and shedding had caused considerable deterioration in many fields; it was opening rapidly and picking was in general progress by September 1. Tobacco was generally in fair condition, but below the average in some of the largest producing districts. All late crops suffered from lack of moisture, except in a few localities.—*H. C. Bate.*

**Texas.**—The month began with highly favorable weather conditions and all crops were generally in good condition. The excessively high temperatures that prevailed throughout the month, which was the driest in the history of the Texas weather service, caused a marked deterioration in all crops. Cotton especially failed rapidly as the month advanced, and by its close the bright prospects for a full crop that obtained in July had given place to extreme disappointment. Cotton picking progressed rapidly throughout the month, with yields generally unsatisfactory. Boll worms and weevil were unusually destructive, but these insects began diminishing during the last decade of the month. The gathering of early planted corn was well under way by the close of the month, but the yield was very short. Sugar cane and rice promised excellent crops, but suffered to some extent from the prevailing hot and dry weather. June corn and all minor crops did fairly well, but showed at the close of the month the need of rain.—*Edward H. Bowie.*

**Utah.**—Heavy frost occurred in the elevated valleys of the north-central portion of the State on the mornings of the 22d and 31st, doing some damage to spring grain, potatoes, and other tender plants. With this exception, the temperature conditions of the month were favorable to growing crops. Good showers fell over the southern section, but the rainfall over the rest of the State was too light to be of any service.—*L. H. Murdoch.*

**Virginia.**—The condition of the weather throughout the month as affecting crops was in the main highly favorable. The rainfall, though below normal, was frequent and very well distributed, except in portions of the valley division. Fine crops of corn and tobacco are promised. Fall work is progressing favorably, except in the dry part of the valley district.—*Edward A. Evans.*

**Washington.**—The weather was for the most part warm and clear and exceptionally favorable for harvesting. Hot winds during the first decade shriveled a small amount of wheat and oats and had an unfavorable effect upon potatoes. Drought injured pastures, which were somewhat freshened by rains on the 15th, 16th, and 17th. Frosts in exposed localities on the 27th injured tender vines.—*G. N. Salisbury.*

**West Virginia.**—August was rather a dry, cool month with conditions generally favorable for crops, and for the completion of harvesting. During the third week oats were mostly in stack, with above an average yield; thrashing of wheat, rye, and oats was in full progress, and haying was completed with about half a crop. At the close of the month, early corn was maturing nicely, and a good crop was assured; late corn had been improved by the showers, and the prospects were quite promising; fall grass and pastures were also improved, and stock was in very good condition; buckwheat sowing had been completed, and it was growing finely; Irish potatoes had been mostly dug, with a large yield, and sweet potatoes were doing well; some little plowing had been done, but the ground was generally too hard and dry; water was getting scarce, and more rain was badly needed both for crops and the soil.—*E. C. Vose.*

**Wisconsin.**—The month was cool throughout, with light frosts in exposed localities in the central counties on the 12th and killing frosts in the northeastern section on the 22d and 23d. There was, however, no material damage except to tender garden vegetation. The distribution of rainfall was very uneven, ranging from over six inches over the west-central counties to less than half an inch in portions of the southern section. The soil was very dry and plowing difficult until near the end of the month, when a generous rainfall occurred in the central and northern sections. Corn made very slow progress and at the end of the month still needed two weeks of good weather to mature the crop. A large crop of second growth clover was secured in good condition. Apples improved greatly during the month and gave promise of a large crop of excellent

quality. Cranberries made excellent progress and at the end of the month were nearing maturity; the yield promises to be large and the quality excellent.—*W. M. Wilson.*

*Wyoming.*—On the whole the month was unfavorable for growing crops and range lands. It was abnormally dry and practically amounted to a drought. Weather was very favorable for haying, but so damaging to

ranges that no grass was left at end of month. Prospect for winter feed is bad in sections. Alfalfa and native hay crop all in, with average yield for State as a whole. Grain ripened slowly on account of cold nights, but harvest was in general progress. Small crops and gardens did well where water was sufficient for irrigation. Frosts and grasshoppers did some damage. Stock in good condition.—*Charles E. Ashcraft, Jr.*

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings:

Summary of temperature and precipitation by sections, August, 1902.

Section.	Temperature—in degrees Fahrenheit.						Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.				Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.	Station.	Amount.	Station.	Amount.
Alabama.....	82.1	+2.5	Newberne.....	107	20	Hamilton.....	52	25	Bermuda.....	11.09	Letohatchee.....	0.59
Arizona.....	81.4	-0.8	Casagrande.....	119	5	Ashfork.....	35	31	Flagstaff.....	6.10	Several stations.....	0.00
Arkansas.....	80.6	+1.0	Arkadelphia.....	108	4	Pond.....	51	7	Cornburg.....	7.54	Perry.....	0.00
California.....	71.8	-1.6	Saltton, Volcano.....	121	1	Bodie.....	17	16	Sisson.....	4.16	Many stations.....	0.00
Colorado.....	67.1	0.0	Blaine.....	111	4	Breckenridge.....	23	8	Cheyenne Wells.....	6.06	Pagoda.....	T.
Florida.....	82.1	+0.7	Wausau.....	105	21	Macleenny, Summer.....	57	26	Molino.....	9.13	Quincy.....	0.92
Georgia.....	80.3	+1.3	Brent.....	106	21	Clayton.....	53	31	Harrison.....	11.11	Camak.....	0.90
Idaho.....	66.5	-0.8	Garnet.....	105	2	Forney.....	21	18	Pollock.....	1.32	Blackfoot, Oakley.....	0.00
Illinois.....	71.8	-2.4	Equality.....	102	2	Chenuung.....	41	12	Urbana.....	9.79	Antioch.....	0.55
Indiana.....	74.1	-2.6	Hallidayboro.....	14	14	Winamac.....	40	12, 23	Rockville.....	5.36	Vevay.....	0.70
Iowa.....	69.1	-2.0	Madison.....	100	8	Sibley.....	37	11	Columbus Junction.....	15.47	Dubuque.....	1.57
Kansas.....	78.2	+1.0	Mount Vernon.....	2, 3	19	Achilles.....	40	11	Moran.....	14.36	Lakia.....	0.84
Kentucky.....	75.6	-0.9	Perry.....	98	19	Fords Ferry.....	45	12	Blandville.....	5.70	Scott.....	0.86
Louisiana.....	84.1	+2.9	Garden.....	112	20	Mansfield.....	61	13	Schriever.....	9.69	Mansfield, Shreveport.....	0.02
Maryland and Delaware.....	71.7	-2.7	Bowling Green.....	103	3	Deerpark, Md.....	33	17	Baltimore, Md.....	4.31	Jewell, Md.....	0.87
Michigan.....	64.2	-2.1	Alexandria.....	107	17	Newberry.....	29	29	Port Huron.....	4.05	Somerset.....	T.
Minnesota.....	65.2	-3.0	Hancock, Md.....	100	31	Beardsley, Pipestone.....	52	11	Pipestone.....	10.60	Collegeville.....	1.32
Mississippi.....	82.7	+2.5	Kalamazoo.....	95	3	Corinth.....	64	25	Lake Como.....	7.53	Thornton.....	0.50
Missouri.....	75.0	-1.3	Milan.....	96	1	6 stations.....	47	7, 11	Arthur.....	11.49	Galena.....	0.96
Montana.....	63.1	-1.1	Pittsboro.....	107	20	Adel.....	25	30	Glendive.....	2.50	Manhattan.....	0.00
Nebraska.....	71.9	-1.1	Marblehill.....	103	3	Lynch.....	35	11	Kirkwood.....	8.74	Agate.....	0.22
Nevada.....	68.9	-3.1	Glendive.....	102	24	Calloway.....	81	18	Palmetto.....	2.13	Several stations.....	0.00
New England.....	64.8	-2.3	Bridgeport.....	107	1	Monitor Mill.....	30	17	Cornish, Me.....	8.36	Nantucket, Mass.....	0.27
New Jersey.....	70.1	-2.4	Rioville.....	117	2	Fort Fairfield, Me.....	30	17	Trenton.....	10.67	Cancon.....	1.31
New Mexico.....	71.3	+0.3	Salem.....	92	30	Layton.....	40	13, 17	Fort Bayard.....	7.13	Albuquerque.....	0.70
New York.....	65.0	-2.1	Indian Mills.....	11	5	Winsors.....	34	19	Adirondack Lodge.....	6.05	Volusia.....	0.79
North Carolina.....	75.5	-0.5	Alamogordo.....	105	5	Axtion.....	30	13	Kinston.....	8.91	Venior.....	0.90
North Dakota.....	64.3	-1.2	Onconta.....	94	3	Linville.....	39	28	Berlin.....	5.21	Woodbridge.....	0.36
Ohio.....	69.2	-2.5	Chapelhill.....	105	4	Ashley.....	26	11	Demos.....	5.86	Bowling Green.....	0.18
Oklahoma and Indian Territories.....	84.2	+3.1	4 stations.....	96	2, 13, 24	Norwalk.....	37	25	Tahlequah, Ind. T.....	6.14	Jenkins, Okla.....	0.31
Oregon.....	66.0	-0.6	Camp Denison.....	97	3, 30	Kenton, Okla.....	50	5	Jacksonville.....	1.97	Several stations.....	0.00
Pennsylvania.....	67.8	-2.0	Mangum, Okla.....	114	5	Bend.....	26	18, 28	Ephrata.....	6.44	Erie.....	0.51
Porto Rico.....	80.0	0.0	Grants Pass.....	107	6	Irwin.....	34	17	Morovis.....	9.65	Hacienda Amistad.....	2.40
South Carolina.....	78.6	-0.7	Huntington.....	100	31	Cidra.....	55	1	Batesburg.....	8.68	Spartanburg.....	1.20
South Dakota.....	68.2	-3.0	Cayey.....	98	19	Heath Springs.....	55	29	Flandreau.....	9.84	Fort Meade.....	0.07
Tennessee.....	77.0	+0.5	Heath Springs.....	104	22	Howard.....	26	11	Arlington.....	9.36	Springfield.....	1.00
Texas.....	86.1	+3.1	Bowdle.....	101	1	Erasmus.....	42	25	Kent.....	3.70	49 stations.....	0.00
Utah.....	69.4	-1.0	Springfield.....	104	14, 21	Amarillo.....	52	11	Ranch.....	2.25	Promontory, Snow- white.....	0.80
Virginia.....	72.9	-2.6	Cotulla.....	110	30	Tropic.....	23	17	Saxe.....	5.40	Stanton.....	0.00
Washington.....	64.6	-0.9	Green River, Hite.....	110	2	Loa.....	31	24	Sedro-Wooley.....	2.27	Ellensb'g, Sunnyside.....	0.00
West Virginia.....	70.4	-2.6	Saxe.....	100	10	Burkes Garden.....	38	24	Leonard.....	5.90	Cuba.....	0.97
Wisconsin.....	65.5	-2.4	Newport News.....	12	7	Wilbur.....	27	27	Whitchall.....	7.18	Westfield.....	0.38
Wyoming.....	64.8	-1.3	Mottingers Ranch.....	104	7	Travellers Repose.....	35	17	Daniel.....	0.64	Hyattville, Ther- mopolis.....	0.00
			Echo.....	98	30	Butternut.....	30	22				
			New Martinsville.....	99	1	South Pass City.....	25	18				
			Medford.....	103	3	Lolabama.....	19	31				
			Thermopolis.....			Kemmerer.....						

## SPECIAL CONTRIBUTIONS.

### OCEAN CURRENTS.

By JAMES PAGE, United States Hydrographic Office, dated October 18, 1902.

Every method of investigation thus far employed, whether the drift of floating objects, the comparison of the temperature and the specific gravity of specimens drawn from widely distant points, or the distribution of animal organisms inhabiting different localities, all lend support to the belief that the vast mass of water near the surface of the sea and to a very considerable depth below the surface, even at a distance of thousands of miles from the continental shores and hence far removed from local or tidal current influence, is in motion. The continuity of this motion in certain broad and well-defined regions, such as the Tropics, can not but impress us with the idea that it is in a general way cyclic, that is, that the same water

after a lapse of time retraverses approximately the same path.

The source of the energy required to set and keep this vast mass in motion has been productive of endless discussion. The attractive force of the moon, the vis inertiae or lag of the water itself, the difference in temperature and specific gravity of the equatorial and polar regions, the unequal distribution of atmospheric pressure, each in its turn has been proposed and strenuously advocated as the true and only cause of ocean currents. To the seaman, however, the cause of the ocean currents has always been the winds, since the motion of the waters of the sea takes its origin in the region where the latter attain their maximum constancy, viz, in the region of the trades.

The trade winds cover a belt on the earth's surface extend-